DES PreCam

A Proposal for the PreCam Calibration Strategy

DRAFT

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Background-1

- We present an alternative proposal for the PreCam calibration strategy. We're talking about calibration here, not direct science.
- GOAL: To achieve 1% relative photometry across the grid in the manner of SDSS Stripe-82.
- This is a preliminary proposal only.
- We make the assumption that the time calculations in the PreCam Survey proposal (version 0.5) of 8 June 2009 are correct.
- Time allows 2930 pointings over 100 nights.

Background-2

- Rather than covering the 5000 sq. deg. once with modest (50%) overlap, which leads to effectively 1 more tiling of the bright end of the DES, we propose a grid of measurements which should be good to better than 1% relative photometry. This grid will be in place prior to the start of the DES and is positioned so that most (if not all) nights of DES observations will touch at least 1 of the proposed stripes.

Background-3

- This maintains the original advantages of the PreCam Survey:

1. Stars from grid are useful for extinction stds.
3. The baseline grid provides a 1% Global Calib.
4. The 1% calib. increases DES efficiency 10%.
5. Aids DES Quick Reduce Pipeline.
6. DA stars at crossing points.
7,8. On-sky test of H/W, S/W before DES.
9. Possible observer training.
10. Flat screen testing.

Background-4

- Not maintained or not addressed:

1. Robust overlap with Stripe-82, but there are pointings into the stripe.
    Remember goals:
        Relative photometry grid,
        Can make measure of color transforms.

11. Bright object science only in stripes, not full coverage.

Calculations-1

- Assume we have 2930 points to work with.
- Assume the CTIO-CS will allow 1% (rms) photometry via overlap of images ... globally.
  - Edge effects, instrumental systematics ...
- Increase in RA coverage per frame nearer poles.
- Base grid is 10X of 10% of area (500 sq. deg.).
- Beginning with 2% single-pass photometry:
  - $\sqrt{N}$ gives 0.63% N=10; 0.71% N=8; 1.0% N=4
- SDSS Stripe-82 experience shows first 4-10 observations scale as $\sqrt{N}$. Expect similar results.

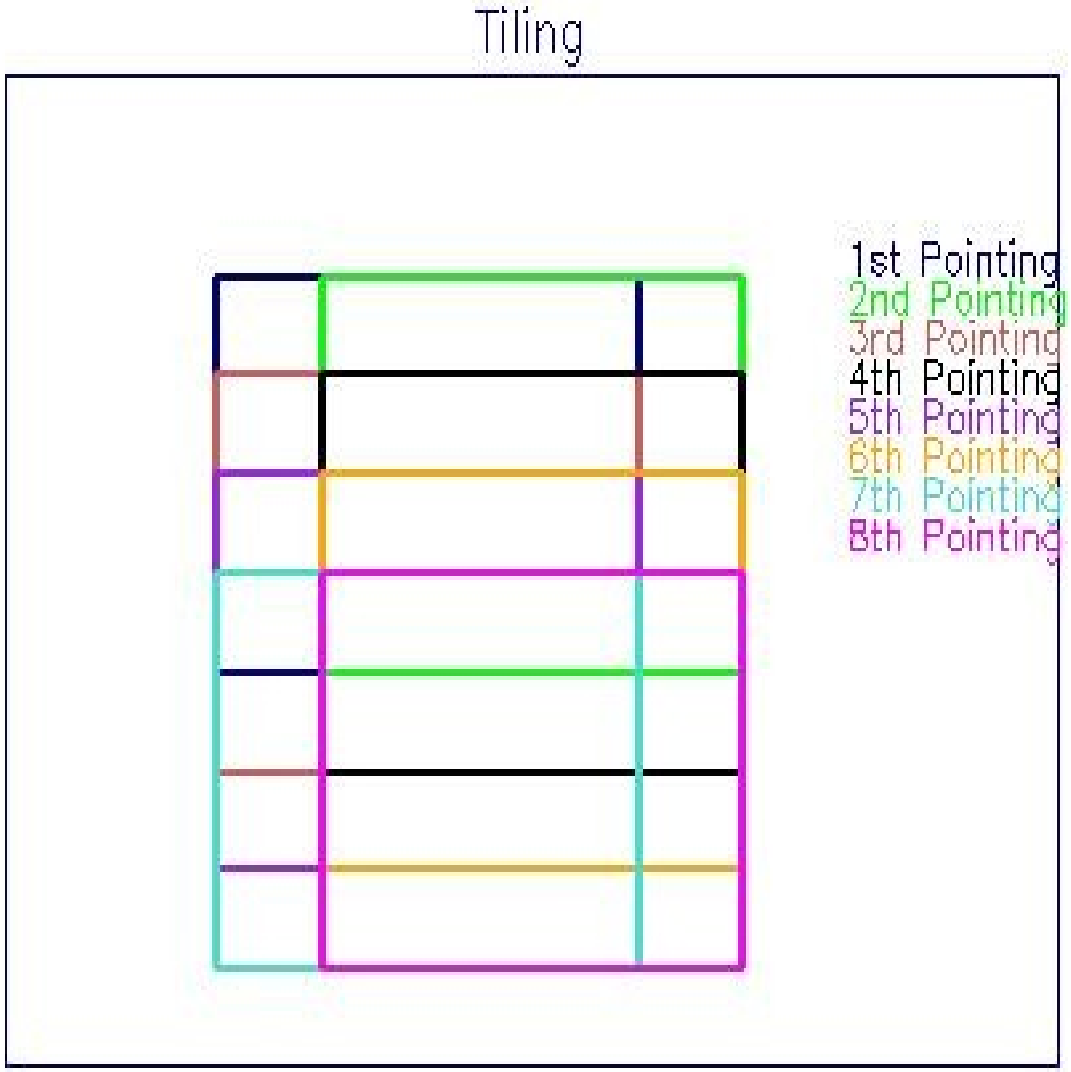
Building the Stripes-1

- The baseline plan of 10 exposures.
- Dither by ~25% side-to-side (frames 1,2)
- Dither along stripe ~25% next set of frames (3,4)
- Continue ... this gives a center stripe 1.2 degrees wide with all 4 chips sampling a large fraction of the stars and 10 exposures. A smaller edge of 0.4 degrees on each side with 2 chips and 5 exposures.

Building the Stripes-2

- If the CTIO-SC does not allow 1% relative photometry over the entire field, this narrower stripe can be tailored to make use of the best portion of the field.
- The crossing points of the stripes will be tweaked to put a DA white dwarf in as many as possible.
- Assume 10% of the imaging will have parallel 1.5m spectroscopic observations of the WDs.
- These crossing points will have ~20 shots each.

Building the Stripes-3



Option-1

The Original DES Footprint:

Grid of:
2 stripes in RA stop 15 deg. from E&W edges:
    Dec = -43.5, -60
Short RA stripe on stripe-82 (35<RA<55)
5 full length stripes in Dec.:
    RA= -45, 0, +35, +90, one at +52.5/+55 (CDFS)

Takes 273 points/pass with “no” overlap
    200 pointings to spare.

Option-1-A

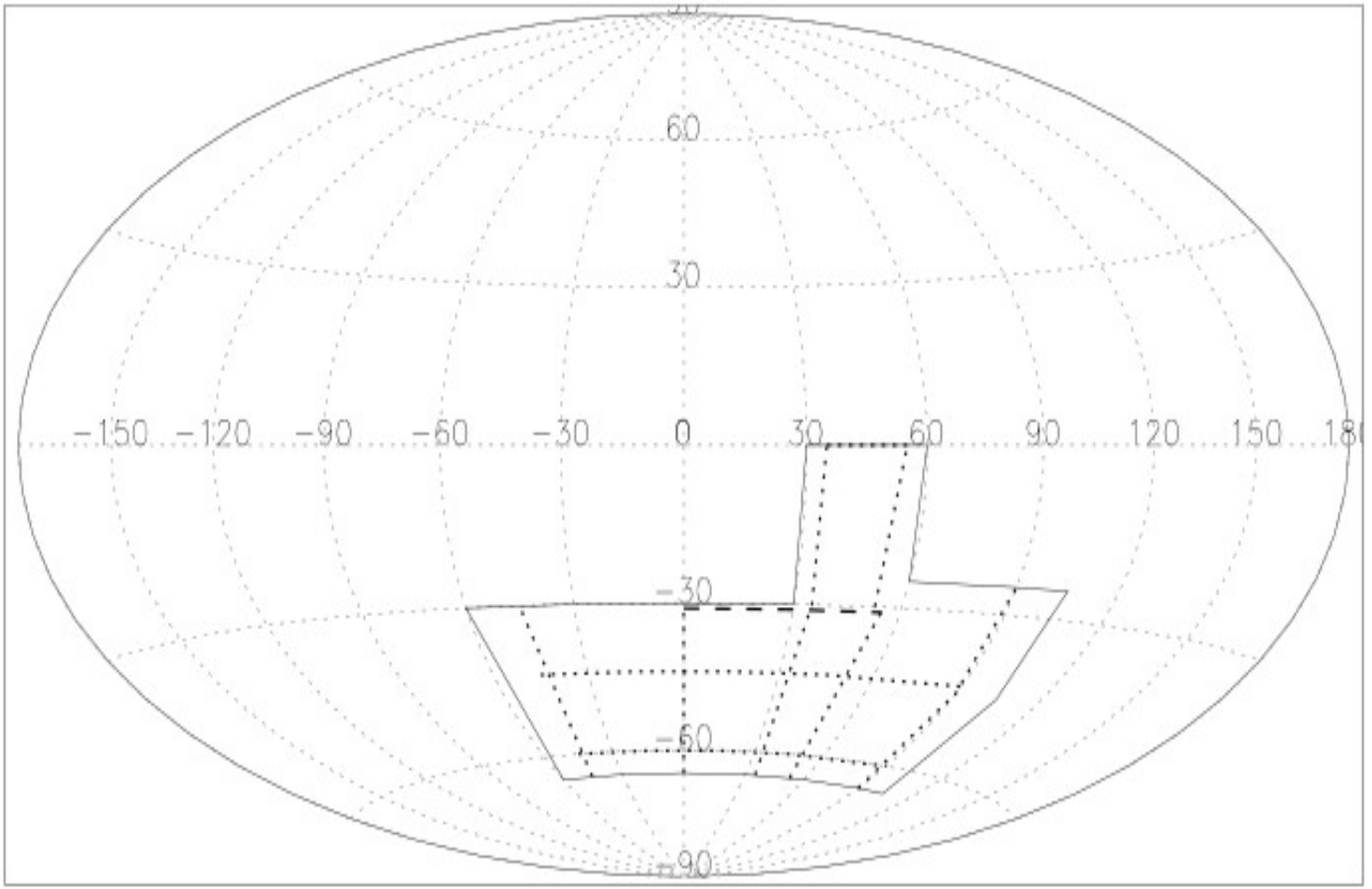
The Original DES Footprint:

Drop to 9 passes.

Same grid plus:

Short RA stripe at Dec = -30 to tie the 2 deep survey fields and extended over to RA=55 to tie to stripe going to CDFS. *N.B.* This does NOT tie the deep survey fields directly to either of the N/S stripes.

Option 1 Cartoon



Option-2

Get rid of the Connection Region and fold it down to the main foot print:

-60 < RA < 105 and -65 < Dec < -22

Stripe-82 SNe field shifts to W above other 2.

3 stripes in RA stop 15 deg. from E&W edges:

Dec = -30, -43.5, -60

4 full length stripes in Dec.:

RA= -45, 0, +45, +90

Stub at RA = 52.5 from -30 < Dec < -27.5 (CDFS)

Non-connected stub RA=35.5, -5.5 < Dec < 0

Takes 293 points/pass with “no” overlap.

Option-2-A

Drop to 9 scans yields 1 extra N/S rib + 50 pts.

Drop to 8 scans yields 2 extra N/S ribs + 100 pts.

Drop to 7 scans yields 3 extra N/S ribs + 150 pts.

RA = -22.5, +22.5, +67.5

+ extend the ends of Dec = -43.5 stripe to edge

Option 2 Cartoon